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E-File

August 31, 2020

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, Pennsylvania 17120

**RE: Petition of PPL Electric for Approval of its Smart Meter Technology
Procurement and Installation Plan
Docket No. M-2014-2430781**

Dear Ms. Chiavetta:

Enclosed for filing on behalf of PPL Electric Utilities Corporation ("PPL Electric") is PPL Electric's Annual Smart Meter Progress Report. This report is being filed pursuant to the Implementation Order issued on June 24, 2019 at Docket No. M-2009-2092655.

Pursuant to 52 Pa. Code § 1.11, the enclosed document is to be deemed filed on August 31, 2020, which is the date it was filed electronically using the Commission's E-Filing System.

If you have any questions regarding the enclosed report, please call me at (610) 774-2599 or Philip S. Walnock, Director – CS Project Management for PPL Electric at (484) 634-3082.

Very truly yours,

A handwritten signature in blue ink, appearing to read "Michael J. Shafer", written over a light blue horizontal line.

Michael J. Shafer

Enclosures

cc: Lori Burger (via email)
Daniel Searfoorce (via email)
Certificate of Service

CERTIFICATE OF SERVICE

(Docket No. M-2009-2123945 and M-2014-2430781)

I hereby certify that a true and correct copy of the foregoing has been served upon the following persons, in the manner indicated, in accordance with the requirements of § 1.54 (relating to service by a participant).

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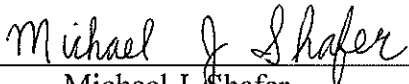
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Date: August 31, 2020

 I.A.T.
Michael J. Shafer

PPL Electric Utilities Corporation
2020 Annual Progress Report
Smart Meter Implementation Plan
(Results to July 31, 2020)
Docket No. M-2014-2430781

August 31, 2020

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Introduction

On September 3, 2015, the Pennsylvania Public Utility Commission (Commission) approved PPL Electric Utilities Corporation's (PPL Electric or Company) Smart Meter Implementation Plan (SMIP) at Docket No. M-2014-2430781. Pursuant to the Implementation Order entered by the Pennsylvania Public Utility Commission (Commission) on June 24, 2009, at Docket No. M-2009-2092655, PPL Electric submits this smart meter progress report for the third period, July 31, 2019 to July 31, 2020 (Current Reporting Period).

The program is on schedule to conclude by the end of 2020; meetings objectives with planned functionality, meter installs, and cost.

PPL Electric oversees a team of program vendors to assist with the planning and implementation of all aspects of the program. Black & Veatch's role on the Project is to provide PPL Electric with program management services and system integration services. Black & Veatch replaced IBM in August 2017.

The Company's technology supplier and meter vendor is Landis + Gyr. They are providing the radio frequency network, Automated Metering Infrastructure (AMI) head end, meter data management system (MDMS), meters and installation services. They are supported by Grid One and Riggs-Distler for network installation, meter installation and meter base repairs. Tesco Services performs quality auditing of work performed.

GE-Digital is providing Mix Director, the primary software system that the Company will use to monitor the AMI network during deployment and in future operations.

Watthour Engineering Company (WECO) is providing the new meter asset management (MAM) system and test boards that is used to test and track meters and network devices.



Black & Veatch provided project management and end-to-end systems integration services.



Landis + Gyr (L+G) is our vendor for the AMI network devices, AMI meters, meter and network deployment, AMI Head End system and Meter Data Management System (MDMS).



GE Digital provided **Mix Director**, the primary system that Advanced Metering Operations (AMO) will use to monitor the AMI network.



WECO provided the new **Meter Asset Management (MAM)** system and test boards that will be used to test and track meters and network devices.



Riggs Distler, an authorized sub-contractor of L+G, completed meter base repairs and installed high-end meters, and removed inactive PLC meters that do not need to be exchanged for AMI meters



Grid One, an authorized sub-contractor of L+G, installed the AMI meters, performed the meter inspection activities, and hosted a call center.

Program Scope

PPL Electric's Smart Meter Implementation Plan (SMIP) was designed to meet the Act 129 requirements by first deploying the systems and infrastructure required to enable the new Automated Metering Infrastructure technology. This was then followed by the deployment of radio frequency (RF) meters replacing PPL Electric's existing 1.4 million power line carrier (PLC) meters over a four-year period.

The following items were deployed as part of the program:

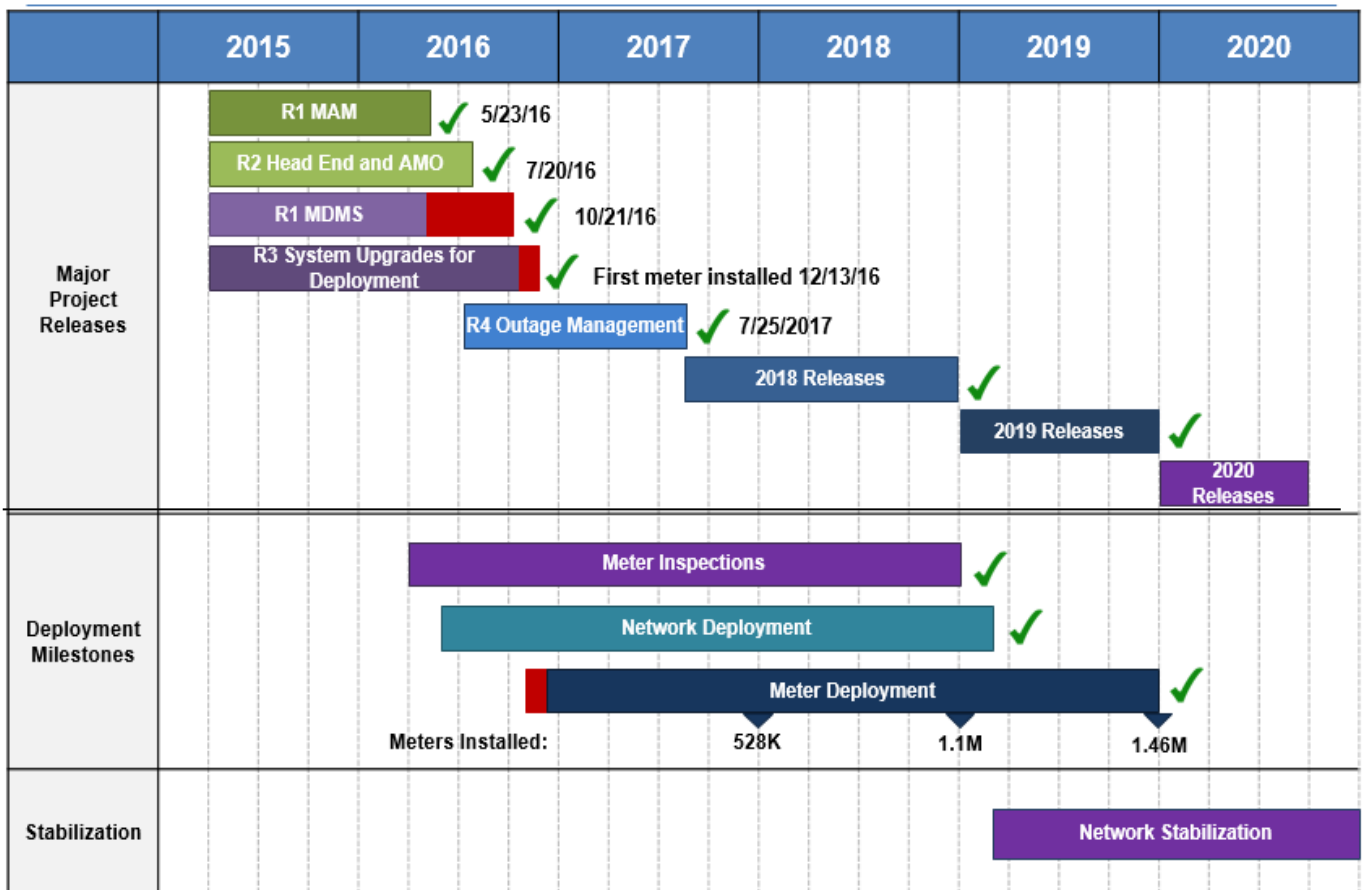
- **Customer Web Portal** – The portal was updated to display the customer's interval usage
- **Electric meters** – Use two-way communication to collect electricity usage and related information from customers and to deliver information to customers
- **Local Area Network (LAN) Collectors and Routers** – Devices used to relay and collect meter data from all meters in a local area and transmit to the head end through a wide area network
- **Wide Area Network (WAN) Fiber and Cellular Backhaul** – Communications infrastructure responsible for transmitting the meter data to the head end
- **AMI Head End** – System that receives the stream of meter data from the field making the data available for other systems

- **Meter Data Management System (MDMS)** – System that collects and stores meter data from the head end system and processes that data into information that can be used by other applications including network operations, customer information system, analytics and asset management
- **Meter Asset Management Tool** – Tool used to store the meter and network components information and manages the life cycle of the asset
- **Mix Director** – Tool used to track and perform analysis and analytics on meter and network information, along with deployment and operations
- **Home Area Network (HAN) Devices** - Customer-owned devices that connect via Zigbee to the meter and display energy usage information

Release Schedule

All of the systems and technology previously mentioned have been deployed or will be deployed by the end of 2020. The information technology release schedule below covers the initial deployment of the systems followed by releases of additional capabilities. Releases 1 through 3, completed in 2016, were foundational to enable functionality for the deployment of the radio frequency (RF) meters. Subsequent releases enable advanced capabilities.

Below is an overview of the releases followed by a description of the enabling capabilities.



2018 Releases	2019 Releases	2020 Releases
<p><i>Support for a subset of enhanced RF functionality and operational efficiencies</i></p> <ul style="list-style-type: none"> ▪ AMI to OMS – Restoration (Power Up) messages for restored customers and Customer Service IVR ping capability ▪ Command Center 7.1 MR3 – Production Upgrade ▪ Home Area Network (HAN) Pilot ▪ Priority Meter Alerts to Automated Filed Ticket Creation ▪ Inventory Badge Scanning ▪ Added Service Delivery Point (SDP) to Electric Facilities Database (EFD) ▪ Enhance Analytics Mix Director Work Bench 	<p><i>Support for a subset of enhanced RF functionality and operational efficiencies</i></p> <ul style="list-style-type: none"> ▪ Network Model Validator – Identifying meter to transformer mismatches (AMI to OMS improvements) ▪ Mix Director Upgrade ▪ Polyphase Meter Diagnostic Notifications ▪ MDMS Enhancements <ul style="list-style-type: none"> - Estimates to CSS for Billing ▪ Nominal Voltage ▪ Command Center 7.3 MR2 – Production Upgrade <ul style="list-style-type: none"> Meter Asset Management updates to support Return Merchandise Authorization (RMA) process and improved inventory tracking ▪ Home Area Network Program ▪ Begin transition of RF Network Management to PPL 	<p><i>Support for a subset of enhanced RF functionality and operational efficiencies</i></p> <ul style="list-style-type: none"> ▪ RF Network Management transition to PPL, including Field Backoffice Support ▪ Deployment of Advanced Security Devices ▪ Meter Asset Management updates to support Meter Failure Tracking and reporting ▪ Revenue Protection & AMI advanced analytics

Deployment

The Company's deployment plan was executed in accordance with the Smart Meter Plan. The full-scale deployment of RF meters began in December 2016 with mass deployment completed the end of 2019.

Meter deployment is broken into three distinct phases:

- Meter inspections, or pre-sweeps, were performed to identify issues or barriers to be resolved prior to physical meter deployment. An example is the identification of meter bases that need repair or replacement for a successful meter exchange.
- Network deployment is the build-out of the AMI network infrastructure of collectors and routers to transmit data and information from the meter to the AMI head-end system.
- Meter deployment is the physical replacement of the Company's existing PLC meters to new RF meters.

The first three deployment phases occurred on a regional basis sequentially through PPL Electric's six major operating regions: Harrisburg, Lancaster, Lehigh, Northeast, Central, and Susquehanna. The final phase occurred across the entire service area based on resource availability and need.

Meter Inspections

PPL Electric precedes physical meter deployment with a meter inspection phase. This work began in October 2015 and occurred approximately six to eight months prior to meter installations in a given region. Meter inspections finished in at the end of 2018 with a total of 1.39 million inspections completed across PPL Service Territory.

These inspections identified any Rules for Electric Meter Service Installation (REMSI) violations; REMSIs are the Company's standards for meter installations. As stated earlier, PPL Electric was also able to anticipate meter base repairs that will be required in the course of meter deployment.

Network Deployment

Deployment of the radio frequency network preceded meter installation by approximately five months. Planned RF network build out was completed in early 2019. After the initial deployment of the network components, additional work remains to optimize the network and provide support for maximum effectiveness. RF network optimization will continue through stabilization.

Collectors are being installed to form the backbone of the radio frequency network. These collectors are the "take out points" for all network data and they communicate back to the AMI Head End via cellular communications or optical fiber. As of July 31, 2020, 255 collectors have been installed with 67 collectors deployed as a part of network optimization.

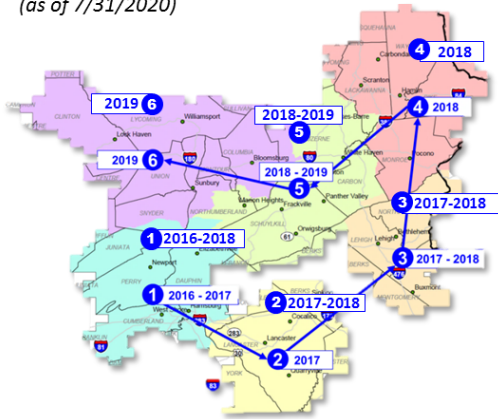
Routers will support collectors as a part of the RF Network. Routers are radio frequency devices that intercede between meters and other routers to ensure a fully formed radio mesh network allowing for a variety of communication paths from meter to collector. As of July 31, 2020, 5,077 routers have been installed with approximately 427 deployed through network optimization.

Meter Deployment

RF meter exchanges began in the Harrisburg region in December 2016, the Lancaster region in July 2017, the Lehigh region in November 2017, the Northeast Region in May 2018, the Central Region in Oct 2018, and Susquehanna Region in March 2019.

As of July 31, 2020, 1,467,105 meter exchanges have been completed. Mass meter deployment is complete in all regions. There are 40 remaining meter endpoints that still have PLC meters on them. These locations are on hold due to PUC complaint proceedings and will be exchanged when the approval to proceed is granted.

(as of 7/31/2020)



Region	Pre-Sweep Inspections	Network Installations	Mass Meter Deployment	PPL UTC Clean Up
1. Harrisburg	Complete	Complete	Complete	100.00%
2. Lancaster	Complete	Complete	Complete	100.00%
3. Lehigh	Complete	Complete	Complete	100.00%
4. Northeast	Complete	Complete	Complete	100.00%
5. Central	Complete	Complete	Complete	100.00%
6. Susquehanna	Complete	Complete	Complete	100.00%

Note: 'End' represents mass deployment planned completion month

Meter Base Repairs

PPL Electric is repairing meter bases in instances where the meter base conditions may not be conducive to safe meter exchanges. Approximately 10,721 meter base repairs were completed for exchange of a RF meter. Repairs to facilitate a meter exchange were conducted at a rate of approximately 0.8% of the premises where meters have been installed.

Progress on the End-to-End Solution

PPL Electric has delivered strong meter reading performance with its legacy PLC based AMI system. Meter read performance of the new RF based system is also performing at a very high level, exceeding the industry standard read rate of 99.5%.

Metric	Target	2017 Total	2018 Total	2019 Total	2020 Total*
Interval	99.75%	99.89%	99.82%	99.86%	99.97%
Billing Register	99.75%	99.90%	99.79%	99.86%	99.87%

* 2020 Results through July 31, 2020

Customer Interaction

In accordance with the PPL Electric's approved Communications Plan, all customers were notified of pending meter replacements in several separate contact attempts. Each customer received a letter six weeks and three weeks prior to the meter exchange. Customers also received an automated phone call the day before their planned meter exchange. On the day of the installation, the installer knocked on the customer's door prior to the meter exchange. A door hanger was left at the premise at the conclusion of the visit.

PPL Electric has received 3,083 customer inquiries regarding the program out of 1,467,105 installations, or 0.21% of the installations. Some topics of these inquiries include:

- Questions regarding field work to be performed or completed
- Questions about scheduling an appointment for a meter exchange
- Statements regarding not wanting a new meter due to health and/or privacy concerns

There are currently zero pending customer inquiries.

Remote Connect / Remote Disconnect

Remotely connecting or disconnecting service (RCRD) went live on April 1, 2017. The matrix below outlines transaction success rate by process and overall.

RCRD Performance

		2017 Total	2018 Total	2019 Total	2020 Total *	Project To Date
Cut-Ins	Total Cut-Ins Attempts	8,833	33,798	39,544	1,128	83,303
	Total # of Successful Cut-Ins	8,618	33,473	39,416	1,124	82,631
	% Successful Cut-Ins	97.6%	99.0%	99.7%	99.6%	99.2%
Cut-Outs	Total Cut-Outs Attempts	11,222	43,809	53,005	1,966	110,002
	Total # of Successful Cut-Outs	11,013	43,239	52,830	1,964	109,046
	% Successful Cut-Outs	98.1%	98.7%	99.7%	99.9%	99.1%
Move-In	Total Move-In Attempts	10,475	48,725	62,834	28,346	150,380
	Total # of Successful Move-Ins	10,370	48,513	62,710	28,279	149,872
	% Successful Move-Ins	99.0%	99.6%	99.8%	99.8%	99.7%
Move-Out	Total Move-Out Attempts	8,312	38,355	48,236	24,351	119,254
	Total # of Successful Move-Outs	7,990	37,710	48,114	24,272	118,086
	% Successful Move-Outs	96.1%	98.3%	99.7%	99.7%	99.0%
Total	Total Transactions	38,842	164,687	203,619	55,791	462,939
	Total Successful Transactions	37,991	162,935	203,070	55,639	459,635
	% Successful Total Transactions	97.8%	98.9%	99.7%	99.7%	99.3%

* 2020 Results through August 9, 2020

Financial Analysis / Cost Recovery

The financial analysis below shows actual costs per year and split between capital and operational and maintenance costs. This view shows the actual costs since project inception along with projections for future costs.

Actual Spend	Capital	Expense	Total
12/31/2015	\$ 24,896,798	\$ 2,535,621	\$ 27,432,419
12/31/2016	\$ 70,874,632	\$ 2,426,326	\$ 73,300,958
12/31/2017	\$ 133,868,867	\$ 8,149,909	\$ 142,018,776
12/31/2018	\$ 118,216,208	\$ 8,346,431	\$ 126,562,639
12/31/2019	\$ 71,682,013	\$ 5,788,652	\$ 77,470,665
7/31/2020	\$ 19,511,026	\$ 3,760,059	\$ 23,271,085
Total Project to Date	\$ 439,049,544	\$ 31,006,998	\$ 470,056,542
Projected Spend			
8/1/2020-12/31/2020	\$ 4,548,974	\$ -	\$ 4,548,974
Total Projected	\$ 4,548,974	\$ -	\$ 4,548,974
Total Actual + Projected	\$ 443,598,518	\$ 31,006,998	\$ 474,605,516

Look Ahead

With only 40 meter installations pending to be completed, PPL Electric is in the process of completing stabilization and looking to conclude the plan by the of this year.

Conclusion

In summary, PPL Electric has followed its approved SMIP without the need for any material modifications. The RF meters installed, along with the scope, schedule, and cost of the program, are in direct alignment with the approved plan.